

Serial No.: 10/812,467
Office Action Date: 11 January 2007

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REMARKS/ARGUMENTS

This is in response to the Office Action issued on 01/11/2007, with claims 1-26 pending in the application. Claims 1-26 stand rejected. By this response to the Office Action, claims 1 and 18 have been amended. New claims 27-36 have been added. Claims 2-9 and 19-26 have been canceled. No new matter has been added by this response to the Office Action.

Consideration of claims 1, 10-18, and 27-36 is respectfully requested.

Claim Rejections – 35 U.S.C. § 102(b)

Claims 10, 13, 18, 19, 21, and 22 are rejected under 35 U.S.C. § 102(b) as being anticipated by Ito, et al, USPN 5,775,099 (*Ito*).

Claim 18 has been amended to more particularly point out and distinctly claim the subject matter of the invention. Claims 19, 21, and 22 have been canceled in order to put the application in condition for allowability, and not for reasons of patentability.

Applicant respectfully traverses any rejection of claims 10, 13, and 18, in view of *Ito* because *Ito* fails to teach or suggest all the elements of the claims, as is required under 35 U.S.C. § 102(b).

Applicant respectfully asserts that previously presented claim 10 is patentably distinguishable over *Ito*, because *Ito* fails to teach or describe all the elements of claim 10, as is required under 35 U.S.C. § 102(b). Claim 10 sets forth a method for controlling regeneration of a NOx trap comprising, *inter alia*, estimating an accumulated NOx in a NOx trap located in the exhaust path of an engine; and, hastening regeneration of the NOx trap by reducing the size of a stratified charge operating region of the engine when the accumulated NOx exceeds a first threshold value and initiating regeneration when the stratified charge operating region of the engine is exited. Reducing the stratified charge operating region comprises reducing engine speed and engine load at which to operate the engine in stratified charge operating mode.

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The office action asserted that *Ito* teaches first and second engine operating regions defined by engine speed and load, pointing to Lines 51-56 of Col. 10 to support that assertion. However, the disclosure of *Ito* teaches a method for controlling a direct injection internal combustion engine operable in a homogeneous region of operation and a non-homogeneous region of operation, wherein engine operation in the homogeneous region of operation is separated from operation in the non-homogeneous region of operation based only upon engine load, using depression L of the accelerator pedal 40 to represent load. (See, Fig 6, Fig. 7, and item 118 of Fig. 17).

Applicant respectfully traverses any assertion that *Ito* teaches or describes hastening regeneration of the NO_x trap by reducing the size of a stratified charge operating region of the engine, wherein reducing the stratified charge operating region comprises reducing engine speed and engine load at which to operate the engine in stratified charge operating mode, as claimed in claim 10 and described in the instant invention.

The disclosure of *Ito* fails to teach or describe first and second engine operating regions defined by engine speed and load. With reference specifically to Figs. 14A and 14B of *Ito*, the specification states that the figures are used to explain 'the method of estimating the amount of NO_x absorption'. (See, Col. 10, lines 18-19). The amount of NO_x absorbed in the NO_x absorbent per unit time becomes a function of the engine load and rotational speed (See, Col. 10, lines 27-29). The NO_x amount A is stored in advance in the ROM 33 as a function of L and N in the form of the map shown in Fig. 14A. (See, Col. 10, lines 39-41). The amount D of NO_x released from the NO_x absorbent per unit time is a function of the amount of depression L of the accelerator pedal and engine rotational speed, stored in advance in ROM in the form of the map shown in Fig. 14B as a function of L and N. (See, Col. 10, lines 57-62). Thus, *Ito* discusses NO_x adsorption based upon engine speed and load (See, e.g., Col. 10, Lines 20-62), but fails to teach reducing the size of a stratified charge operating region of the engine comprising reducing engine speed and engine load.

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Furthermore, applicant respectfully argues that *Ito* provides no teaching of hastening regeneration of the NO_x trap by reducing the size of a stratified charge operating region of the engine, wherein reducing the stratified charge operating region comprises reducing engine speed and engine load at which to operate the engine in stratified charge operating mode.

Therefore, claim 10 is patentably distinguishable from *Ito*, and thus allowable.

Claim 13 is dependent upon now allowable claim 10, with further limitations, and is therefore patentably distinguishable from *Ito* for the same reasons as set forth with regard to claim 10, and is thus allowable.

Claim 18 has been amended to more particularly point out and distinctly claim the patentable subject matter of the invention, consistent with the amendments to claim 1 (described hereinbelow) and is therefore patentably distinguishable over *Ito* for the same reasons as set forth with regard to Claim 1.

Claims 19, 21, 22 have been canceled in order to put the application in condition for allowability, and not for reasons of patentability.

Claim Rejections 35 U.S.C. §103(a)

Claims 14 and 23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claims 13 and 22 respectively, in view of Ishii, et al. (U.S. Patent Application 2002/0029562) ("*Ishii*").

Claim 14 is dependent upon now allowable claim 10, with further limitations, and is patentably distinguishable from *Ito* in view of *Ishii* for the same reasons as set forth with regard to claim 10, and is therefore allowable.

Claim 23 has been canceled in order to put the application in condition for allowability, and not for reasons of patentability.

Claims 20 and 24-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claim 18, in view of *Ishii* and *Takeshima* (USPN 5,437,153).

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Claims 20 and 24-26 have been canceled in order to put the application in condition for allowability, and not for reasons of patentability.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claim 10, in view of *Wachi*.

Claim 11 is dependent upon allowable claim 10, with further limitation, and therefore allowable.

Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claim 10, in view of *Wachi*, and further in view of *Ishii* and *Takeshima*.

Claim 12 is dependent upon allowable claim 10, with further limitation, and therefore allowable.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claim 13, in view of *Gui*.

Claim 15 is ultimately dependent upon allowable claim 10, with further limitation, and therefore allowable.

Claims 16-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claim 13, in view admitted prior art.

Claims 16 and 17 are ultimately dependent upon allowable claim 10, with further limitation, and therefore allowable.

Claims 1, 2, 4, and 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* in view of *Takeshima*.

Newly amended claim 1 sets forth a method for controlling a direct injection internal combustion engine that is selectively operative in one of a homogeneous charge combustion mode and a stratified charge combustion mode, and having an exhaust gas conduit fluidly connected to a NO_x trap. The method comprises, inter

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alia, defining a first engine operating region, and defining a second operating region consisting of a reduced portion of the first operating region. The engine operation is monitored, and a cumulative mass of NO_x stored on the NO_x trap device is determined. The engine is operated in the stratified charge combustion mode only when the engine operation is within the first operating region and the cumulative mass of NO_x stored on the NO_x trap device is less than a threshold. The engine is operated in the stratified charge combustion mode only when the engine operation is within the second operating region and the cumulative mass of NO_x stored on the NO_x trap device is greater than the threshold. The operating regions are described in Para. 0023 of the specification and exemplary operating regions are depicted with reference to Figs. 3A and 3B of the invention. The threshold comprises a fraction of capacity of the NO_x trap, which is described in Para. 0022 of the invention.

Ito teaches a method for controlling a direct injection internal combustion engine operable in a homogenous region of operation and a non-homogeneous region of operation, the engine including a NO_x trap generally effective to accumulate NO_x emissions during lean operation and to release accumulated NO_x emissions during rich operation, wherein engine operation in the homogeneous region of operation is separated from operation in the non-homogeneous region of operation based only upon engine load, using depression L of the accelerator pedal 40 to represent load. (See, Fig 6, Fig. 7, and item 118 of Fig. 17).

Applicant respectfully asserts that newly amended claim 1 is distinguishable from *Ito* because *Ito* fails to teach or suggest operating the engine in the stratified charge combustion mode only when the engine operation is within the first operating region and the cumulative mass of NO_x stored on the NO_x trap device is less than a threshold. Furthermore, *Ito* fails to teach or suggest operating the engine in the stratified charge combustion mode only when the engine operation is within the second operating region and the cumulative mass of NO_x stored on the NO_x trap device is greater than the threshold, as described and detailed above.

Thus, newly amended claim 1 is patentably distinguishable over *Ito*, and therefore allowable over *Ito* in view of *Takeshima*.

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Claims 2, 4, and 5 have been canceled in order to put the application in condition for allowability, and not for reasons of patentability.

Claims 6, and 3, 7-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* in view of *Takeshima*, and further in view of *Ishii*.

Claims 6, and 3, 7-9 have been canceled in order to put the application in condition for allowability, and not for reasons of patentability.

New Claims

New claims 27-36 have been added to more particularly point out and distinctly claim the subject matter of the invention. No new matter has been added thereby. Each of the new claims 27-36 is ultimately dependent upon now allowable claim 1, with further limitation, and therefore allowable.

Conclusion

Based on the above, it is respectfully submitted that claims 1, 10-18, and 27-36 are in condition for allowance, and therefore, the same should be allowed to proceed to issue. If the Examiner has any questions regarding the contents of the present response the Applicants' attorney may be contacted at the phone number appearing below.

Respectfully submitted,



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